Cholera

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Cholera is an acute diarrheal disease caused by enterotoxins produced by *Vibrio cholerae* bacteria. Two serogroups, O1 and O139, are responsible for causing extensive epidemics and worldwide pandemics of disease. Non-toxigenic or non-O1, non-O139 *V. cholerae* infections can cause sporadic illness but do not cause epidemics.

Note: This chapter only pertains to *Vibrio cholerae*. Other species of *Vibrio* (*e.g., V. parahaemolyticus, V. vulnificus*) are not reportable except in outbreak situations.

B. Clinical Description

Infection by O1 or O139 serogroups of *V. cholerae* usually results in asymptomatic or mild illnesses involving only diarrhea. Approximately 1 out of 20 people infected, however, will develop more severe illnesses characterized by profuse watery stools, nausea, some vomiting and leg cramps. Because of rapid loss of body fluids, dehydration and shock can occur in the most severe cases. Without rehydration therapy, death can result within hours. The case-fatality rate in severe untreated cases may exceed 50%; with proper treatment, the rate is <1%.

C. Reservoirs

Humans are the primary reservoir although environmental reservoirs exist in brackish or estuarine aquatic environments.

D. Modes of Transmission

V. cholerae is usually transmitted via the ingestion of food or water contaminated (directly or indirectly) by feces or vomitus of infected persons (*e.g.*, via sewage) or by ingestion of raw or undercooked seafood harvested from polluted waters.

E. Incubation Period

The incubation period ranges from a few hours to 5 days; more commonly it is 2 to 3 days.

F. Period of Communicability or Infectious Period

Although direct person-to-person spread has not been demonstrated, cholera is presumably transmitted as long as stools test positive for the bacterium, most likely until a few days after recovery from symptoms. Shedding of bacteria may occasionally persist for several months. Antibiotics effective against the infecting strains shorten the period of communicability.

G. Epidemiology

Since the early 19th century, pandemic cholera has appeared off and on in most parts of the world. In 1991, an epidemic began in Peru that quickly spread to other countries in South America. By 1994, more than 950,000 cases of cholera in the Western Hemisphere had been reported to the World Health Organization. In the United States, most cases occur among travelers returning from areas experiencing epidemic cholera. Sporadic cases have also occurred among persons ingesting inadequately cooked shellfish harvested from coastal waters along the Texas and Louisiana borders. People at increased risk for cholera infection include those with low gastric acidity and people with blood group “O.” Studies show that some protection against biotypes (strains) within a

serogroup is conferred from previous infection. No protection, however, results from infection with O1 serogroup against O139 serogroup and vice versa.

H. Bioterrorist Potential

Vibrio cholerae O1 and O139 are considered potential bioterrorist agents. If acquired and properly disseminated, *Vibrio cholerae* O1 and O139 could cause a serious public health challenge in terms of ability to limit the numbers of casualties and control other repercussions from such an attack.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. What to Report to the Massachusetts Department of Public Health

Report either of the following:

- Isolation of *Vibrio cholerae* O1 or O139 from stool or vomitus, or
- Serologic evidence of recent infection.

Note: Also report any suspected exposure to *Vibrio cholerae* O1 or O139 that may be bioterrorist in nature.

Note: Other species of *Vibrio* (*e.g., V. parahaemolyticus, V. vulnificus*) are not currently required to be reported by Massachusetts regulations except in outbreak situations. See Section 3) C below for information on how to report a case.

B. Laboratory Testing Services Available

The Massachusetts State Laboratory Institute (SLI), Enteric Laboratory will test stool specimens for the presence of *Vibrio cholerae*. (It can also further identify isolates of *V. cholerae* as serogroup O1. *V. cholerae* non-O1 are sent to CDC for serogroup O139 testing.) The Enteric Laboratory will also confirm and/or further identify isolates of other *Vibrio* species obtained from stool specimens at other laboratories.

Additionally, the Enteric Laboratory requests that all laboratories submit *all* isolates of *V. cholerae, V. vulnificus and V. parahaemolyticus* cultured for further testing to aid in the public health surveillance necessary for this illness. Blood specimens requiring serologic testing for evidence of recent infection are sent to the Centers for Disease Control and Prevention (CDC). Contact the Enteric Laboratory to submit blood samples to CDC. For more information on submitting specimens contact the Enteric Laboratory at (617) 983-6609.

The SLI, Reference Laboratory will confirm and/or identify *Vibrio* species from sources others than stool (*e.g.,* wound). For more information call the Reference Laboratory at (617) 983-6607.

The SLI, Food Microbiology Laboratory (617-983-6616) can test implicated food items from a cluster or outbreak. See Section 4) D, Environmental Measures, for more information.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify sources of major public health concern (*e.g.,* contaminated water or a contaminated lot of shellfish) and to stop transmission from such a source.
- To identify human cases of epidemic strains of *V. cholerae* to prevent transmission from such individuals.
- To identify cases and clusters of human illness that may be associated with a bioterrorist event.

B. Laboratory and Healthcare Provider Reporting Requirements

Please refer to the lists of reportable diseases (at the end of this manual's introductory section) for specific information.

C. Local Board of Health Reporting and Follow-Up Responsibilities

1. **Reporting Requirements**

Massachusetts Department of Public Health (MDPH) regulations (*105 CMR 300*) stipulate that each local board of health (LBOH) must report the occurrence of any case of cholera, as defined by the reporting criteria in Section 2) A above. Please refer to the *Local Board of Health Reporting Timeline* (at the end of this manual's introductory section) for information on prioritization and timeliness requirements of reporting and case investigation.

2. **Case Investigation**

a. Case investigation of cholera in Massachusetts residents will be directed by the MDPH Division of Epidemiology and Immunization (due to the rare occurrence of cholera, the primarily imported nature of the disease, and its potential severity). If a bioterrorist event is suspected, the MDPH and other response authorities will work closely with LBOHs and provide instructions/information on how to proceed.

b. Following notification to the MDPH, the LBOH may be asked to assist in completing an official CDC *Cholera and Other Vibrio Illness Surveillance Report* form (in Appendix A) by interviewing the case and others who may be able to provide pertinent information. Much of the information required on the form can be obtained from the healthcare provider or the medical record. Use the following guidelines to assist you in completing the form:

1) Accurately record the "Demographic and Isolate Information," type of cholera isolated (O1, O139, or non-O1 non-O139), source, and date of specimen. Be sure to include the patients' complete name and address at the top of the form. Please note that other species of *Vibrio* (*e.g., V. parahaemolyticus*) are not currently reportable except in outbreak situations.
2) In the "Clinical Information" section, indicate the date of symptom onset, symptoms, and other medical information. *Note:* Regarding Question 8 (Pre-Existing Conditions) in this section, if immunodeficiency is a condition, do not indicate a patient's HIV status.
3) Complete the "Epidemiologic Information" section. When asking about exposures, follow the incubation period guidelines provided on the form (for example, "Did the patient travel in the 7 days before illness began?").
4) Complete the "Seafood Investigation" section if illness is suspected to be related to seafood consumption. Record any restaurants, oyster bars, or food stores at which seafood was obtained by the case. If you suspect that the case became infected through food, use of the MDPH *Foodborne Illness Complaint Worksheet* (in Appendix A) will facilitate recording additional information. It is requested that LBOHs fax or mail this worksheet to the MDPH Division of Food and Drugs (see top of worksheet for fax number and address). This information is entered into a database, and will help link other complaints from neighboring towns, thus helping to identify foodborne illness outbreaks. *This worksheet does not replace the Cholera and Other Vibrio Illness Surveillance Report form*.
5) If you have made several attempts to obtain case information, but have been unsuccessful (*e.g.,* the case or healthcare provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason why it could not be filled out completely.

c. After completing the form, attach lab report(s) and fax (in an envelope marked "Confidential") to the MDPH Division of Epidemiology and Immunization, Surveillance Program. The mailing address is:

MDPH, Division of Epidemiology and Immunization
Surveillance Program, Room 241
305 South Street
Jamaica Plain, MA 02130

d. Institution of disease control measures is an integral part of case investigation. It is the LBOH responsibility to understand, and, if necessary, institute the control guidelines listed below in Section 4), Controlling Further Spread.

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (*105 CMR 300.200*)

Foodhandlers with cholera must be excluded from work. *Note:* A case of cholera is defined by the reporting criteria in Section 2) A of this chapter.

Minimum Period of Isolation of Patient

After diarrhea has resolved, foodhandling facility employees may only return to work after producing one negative stool specimen. If the case is treated with an antimicrobial, the stool specimen shall not be submitted until at least 48 hours after cessation of therapy. In outbreak circumstances, a second consecutive negative stool specimen will be required prior to returning to work.

Minimum Period of Quarantine of Contacts

Contacts with diarrhea, who are foodhandling facility employees, shall be considered the same as a case and handled in the same fashion. No restrictions otherwise.

B. Protection of Contacts of a Case

Persons who shared food or water with a case during their infectious period should be observed for 5 days from last exposure for signs of illness. Preventive antibiotic therapy is usually not recommended for household contacts in the United States since secondary spread is rare. Immunization of contacts is not indicated.

C. Managing Special Situations

Locally Acquired Case

A locally acquired case of cholera is an unusual occurrence as most cases occur among travelers returning from areas experiencing epidemic cholera. If you determine during the course of an investigation that a case or suspect case does not have a recent travel history to an endemic country, contact the epidemiologist on-call at the Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 as soon as possible for assistance in instituting an investigation to determine source of infection and mode of transmission.

Reported Incidence Is Higher than Usual/Outbreak Suspected

If you suspect an outbreak, or if multiple cases are reported among people who have not traveled out of the United States, investigate to determine the source of infection and mode of transmission. A contaminated vehicle (such as water or food) should be sought and applicable preventive or control measures should be instituted. Since person-to-person transmission is theoretically possible, special emphasis should be placed on personal cleanliness and sanitary disposal of feces. Consult with the epidemiologist on-call at the Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850**.** The Division can help determine a course of action to prevent further cases and can perform surveillance for other cases that may cross several town lines and therefore be difficult to identify at a local level.

Note: Refer to the MDPH's *Foodborne Illness Investigation and Control Reference Manual* for comprehensive information on investigating foodborne illness complaints and outbreaks. (Copies of this manual were distributed to local boards of health in 1997–98. It can also be located on the MDPH website in PDF format at <http://www.magnet.state.ma.us/dph/fpp/refman.htm>.) For recent changes (fall of 2000) to the Massachusetts Food Code, contact the Division of Food and Drugs, Food Protection Program at (617) 983-6712 or through the MDPH website at <http://www.state.ma.us/dph/fpp/>.

Note: If a bioterrorist event is suspected, the MDPH and other response authorities will work closely with local boards of health and provide instructions/information on how to proceed.

D. Preventive Measures

Environmental Measures

Implicated food items from Massachusetts or elsewhere in the United States must be removed from the environment. A decision about testing implicated food items can be made in consultation with the Division of Food and Drugs (DFD) or the Division of Epidemiology and Immunization. DFD can help coordinate pickup and testing of food samples. If a commercial product is suspected, DFD will coordinate follow-up with relevant outside agencies.

Note: The role of the DFD is to provide policy and technical assistance with the environmental investigation such as interpreting the Massachusetts Food Code, conducting a HACCP risk assessment, initiating enforcement actions and collecting food samples.

The general policy of the SLI is only to test food samples implicated in suspected outbreaks, not single cases (except when botulism is suspected). The LBOH may suggest that the holders of food implicated in single case incidents locate a private laboratory that will test food, or store the food in their freezer for a period of time in case additional reports are received. However, a single, confirmed case with leftover food consumed within the incubation period may be considered for testing.

Note: Refer to the MDPH's *Foodborne Illness Investigation and Control Reference Manual* for comprehensive information in investigating foodborne illness complaints and outbreaks.

Personal Preventive Measures/Education

To avoid exposure, recommend that individuals:

- Not eat raw or undercooked fish or shellfish. Despite good sanitation, even shellfish harvested from coastal United States waters have periodically been contaminated with *V. cholerae*.
- Always wash their hands thoroughly with soap and water before eating or preparing food, after using the toilet and after changing diapers.
- After changing diapers, wash the child's hands as well as their own.
- In a daycare setting, dispose of feces in a sanitary manner.
- When caring for someone with diarrhea, scrub their hands with plenty of soap and water after cleaning the bathroom, helping the person use the toilet, or changing diapers, soiled clothes, or soiled sheets.

International Travel

Travelers going to cholera endemic areas should pay attention to what they eat and drink. They should also consider getting vaccinated against cholera, but be warned that vaccines* are not 100% effective. Avoiding risky foods however will also help protect against other illnesses, including traveler's diarrhea, typhoid fever, dysentery, and hepatitis A.

Travelers should:

- "Boil it, cook it, peel it, or forget it."
- Drink only bottled or boiled water, keeping in mind that bottled carbonated water is safer than uncarbonated water.
- Ask for drinks without ice unless the ice is made from bottled or boiled water.
- Avoid popsicles and flavored ices that may have been made with contaminated water.
- Eat foods that have been thoroughly cooked and that are still hot and steaming.
- Avoid raw vegetables and fruits that cannot be peeled. Vegetables like lettuce are easily contaminated and are very hard to wash well.

- Peel their own raw fruits or vegetables and do not eat the peelings.
- Avoid foods and beverages from street vendors.
- Avoid undercooked or raw fish or shellfish, including ceviche.
- Not bring any perishable food back to the United States.

For more information regarding international travel and the cholera vaccines, contact the CDC's Traveler's Health Office at (877) 394-8747 or through the internet at <http://www.cdc.gov/travel>.

*Several vaccines are available that provide varying levels of protection against *V. cholerae*. The oral vaccines provide a high level of short-term protection against O1 strains (approximately several months). The killed whole-cell vaccine provides approximately 50% protection for up to 6 months, but does not prevent asymptomatic infection.

ADDITIONAL INFORMATION

The formal CDC surveillance case definition for cholera is the same as the criteria outlined in Section 2) A of this chapter. (CDC case definitions are used by the state health department and CDC to maintain uniform standards for national reporting.) When reporting a case to the MDPH, always refer to the criteria in Section 2) A.

REFERENCES

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